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1. Introduction

Our team motto is, "**Moving from potential to kinetic**." This seems like a reference to physics, and it is, but it is also more than that. CircuitRunners strives to teach and educate our members to become the leaders of society through robotics. In other words, CircuitRunners unlocks its members' potential.

Our program can unlock the potential of more than just our members; it can help as many people as we want it to. The important piece is the effort that CircuitRunners members put in to make it happen.

This outreach notebook showcases the efforts that CircuitRunners students have put in, focusing on the last three years. CircuitRunners has made significant advancements in that timeframe, but we know there are also many things needing improvement.

Team programs for improving member experience within CircuitRunners have not been included and can instead be found within our Business Plan. This notebook concentrates on six of CircuitRunners' most influential outreach programs:

- **Global Outreach**, in which CircuitRunners mentor students from across the world and expand FIRST programs beyond their current scope
- Project "**Drive Forward,**" which increases participation in robotics in our local community through robot demonstrations and presentations
- **Summer Camps**, which educate students in STEM fields and motivate them to continue in STEM
- **FIRST Events**, in which CircuitRunners coordinates with GAFIRST to host competitions for local robotics teams
- **Assistance Events**, which aid local robotics teams in preparing for their competitions and in continuing to participate in FIRST
- And **Advocacy**, in which CircuitRunners promotes STEM education to the influential leaders of the public and private sector

2. Global Reach

This notebook begins with CircuitRunners' global outreach as they are our newest initiative. So far, these efforts center around the 2017 FIRST Global Challenge, starting with our mentoring efforts before the event, then moving on to the competition itself. Afterwards, the section discusses follow up programs CircuitRunners has implemented taking advantage of the contacts we acquired during the challenge. This includes helping teams finance their future trips, assisting teams with starting new FIRST leagues, and mentoring teams in organization and planning.

2.1 Global STEM Corps & Extended Mentoring Efforts

The Global STEM Corps (GSC) is a group of leaders seeking to spread STEM around the world by mentoring FIRST Global Challenge (FGC) Teams. This group consists of high school and college students, FIRST teams, and individuals, who are all paired with one team for the duration of the build season.

Upon hearing of this fantastic opportunity, CircuitRunners took immediate interest and joined the GSC and in 2017, officially mentoring Team Zambia. But how would someone mentor a team across the world? CircuitRunners found unique and effective methods for communicating with Team Zambia, including using email, video calls, and Facebook. Our team was always available to answer any mechanical, programming, or electrical questions about their robot and ensured that our explanations were especially detailed.

Furthermore, CircuitRunners assisted several other teams in the Facebook FIRST Global Community Group. This community group was created as a way

for teams to share pictures and updates about their robot, but it also served as a place to ask for help! If any team had issues with their robots, other FGC teams and mentors could comment on ways to fix them. Throughout the build season, CircuitRunners helped **13** teams solve problems.

In the beginning of the season, CircuitRunners posted this in the FIRST Global Community Facebook Group:

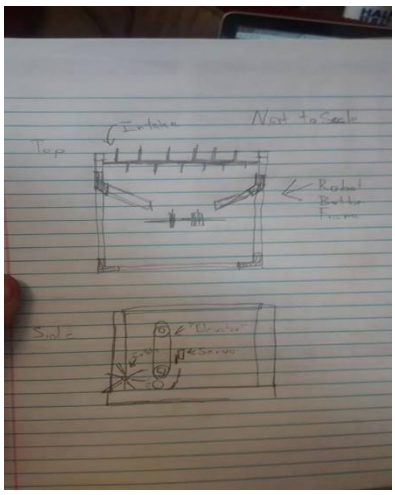
"Hey, I'm a member of CircuitRunner Robotics a group of teams based out of Georgia (USA). If anyone needs any help be it, Mechanical, Electrical, Strategy, Design, Programming or anything. We have multiple Students and Mentors ready to help y'all out if you want it. (PM me or post a comment). I've been following the competition so far and all your robots look AMAZING, and my team will hope to see you all in D.C.!! Good Luck!!"

After this post, CircuitRunners received many questions from various teams! We have included one example below:

Team Cameroon

Question**:** Hi it is team Cameroon. We need help in building the mechanism that you people built in [order] to select the green ball and the orange ball automatically please!!

Response: For the mechanical side, you need a choke point or a single section where all the balls come into for a servo and color sensor system. Then they will go to your storage or scoring system. The only way I know to do that is to create an elevator for the balls and the first step would be to create a choke point... Here is a really quick drawing - not to scale. Hope this helps!

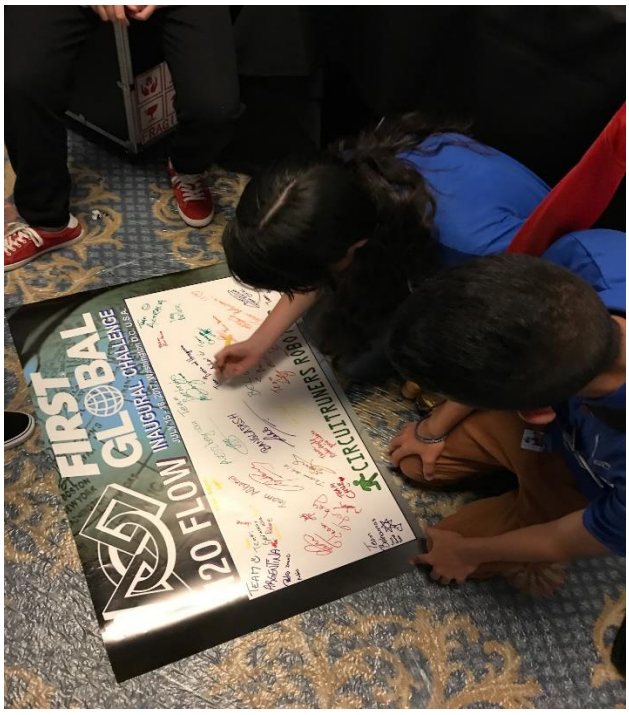


2.2 FIRST Global Challenge

Description: The inaugural FIRST Global Challenge (FGC) was held in July 2017 in Washington, D.C. with **163** teams from **157** different countries. This olympics-style competition focused on one of several world challenges - clean water access. The overall goal of the competition was to gather STEM students from all around the world and challenge them in unexpected ways.

Timeframe: 7/14/2017 - 7/18/2017

Direct Audience Size: Approx. 2,500



Volunteering

CircuitRunners volunteered at the FIRST Global Challenge as Team Ambassadors for Team Zambia, Team Seychelles, and Team Zimbabwe. In this role, we were the main escorts and assistants of the teams, answering all questions and helping in any and all ways possible, including handling match schedule problems, fixing

mechanical issues with the robot, looking for parts, getting tools from the machine shop, and more!

Assistance

Throughout the competition, CircuitRunners made time to assist the participating teams with any issues they may have encountered with the robot and offered our advice for growing their teams. Here are a few examples of interactions we had:

Team Afghanistan

Before the competition, the all-girls Team Afghanistan had issues acquiring VISAs to enter the United States and attend the FGC competition, which drew the attention of the press. At the event, they were surrounded by reporters and unable to exit their pit area to queue for their upcoming matches. CircuitRunners noticed the team was having trouble with this and escorted them and their robot safely to the match fields and ensured they would be able to work on their robot in the pits without unreasonable interruption.

Team Benin, Team Seychelles, and Team Pakistan

During busy competition settings, it is difficult at times to find the necessary resources and parts for the robot. Team Benin and Team Pakistan were struggling to find writing utensils with which they could write plans and reminders on their match schedules and some parts in their kits for their robots Fortunately, CircuitRunners came to FGC equipped with pens, pencils, and markers

to lend to teams, and we also helped them find the parts they needed while they continued to work on other areas of the robot.

Team Hungary

Mechanical issues with the robot are always present at fast-paced and high-pressure competitions. This was evident with Team Hungary's issues with their drivetrain and scaler. Fortunately CircuitRunners was able to assist them with the issue and guide them towards finding a solution.

Team Venezuela

Team Venezuela ran into connectivity issues with their Control Hub not connecting and becoming unpaired during the competition, and they could not figure out how to fix the problem. As CircuitRunners deals with connections for our robots all the time, this was an opportunity for us to share our knowledge and tips for handling these situations. In less than ten minutes, CircuitRunners had the Control Hub connected and working perfectly.

Team Yemen

As FGC robots use smart tablets to run their code, it is crucial that the device stays charged. For Team Yemen, this was difficult, as their charging cable broke. With our help, the team was able to secure an additional working cable to charge their device, and all problems were solved!

Team Zimbabwe

Team Zimbabwe had trouble getting their scaling mechanism to work at the competition, but with the help of CircuitRunners, they were able to have a fully functioning scaler in under half an hour.

Growing FIRST

While in Washington, D.C., CircuitRunners discussed options for expanding FIRST programs around the world with all of the attending teams and offered our assistance to all in doing so. Some of the most interested teams include Team Afghanistan, Team South Africa, Team Indonesia, Team Grenada, and Team Zambia. (More on this in the following sections.)

2.3 FRC in Caribbean

Team Grenada

While talking to Team Grenada, CircuitRunners immediately noticed their immense interest in starting an FRC team. From there, we swapped contact information and began our journey to start this team. Over time, this effort has grown into a much larger project - instead of starting one FRC team in Granada, we have expanded our efforts to creating an entire FRC competition in the Caribbean. This will make FIRST programs more accessible to 25 more countries! This project is still in progress, but with much hard work and dedication, we hope to see an FRC League in the Caribbean in the near future.

Grenada also showed interest in FTC and FLL, so CircuitRunners has worked with them to explain the process for creating FTC and FLL teams, guided them through the process, and given them tips on encouraging other people throughout the Caribbean to do the same.

2.4 FTC in Africa

Team Zambia

In Washington, D.C., Team Zambia loved the format of the FTC-style competition and considered starting a local FTC team. After discussing their options at greater lengths, CircuitRunners and Team Zambia came together to work on beginning an FTC League in Africa with hopes of making FIRST more accessible to all African nations by reducing travel costs. CircuitRunners believes this will set off a chain reaction and Africa will soon be covered in FIRST teams and STEM.

2.5 FGC 2018 Funding

Along with working with teams to expand more FIRST programs globally, CircuitRunners also wants to ensure that teams have the ability to continue participating in the FIRST programs they're already in.

For many teams in Europe and Africa, the FIRST Global Challenges are quite expensive to attend, due to the distance from their home countries. The first FGC was in Washington, D.C. and the second will be held in Mexico City, so it will not become easier to finance travel.

To counteract this, CircuitRunners has been in contact with a number of teams to help them acquire funding. We have explained the sponsorship process and used our experience as a 16-year old team to mentor the teams in procuring funding. So far, CircuitRunners has been able to help Teams Zambia, Cameroon, and Poland, all of whom showed great initiative at the 2017 FGC and a strong desire to return in 2018.

2.6 Keeping in Touch

Today, CircuitRunners keeps in contact with many of the teams we met at FGC and continues to offer assistance in starting and expanding FIRST programs in other countries! In total, CircuitRunners has mentored **33** teams outside of the United States since the FIRST Global Challenge. Here are a few of the teams with whom we remain in contact:

Team Afghanistan

Since FGC, CircuitRunners has continued to mentor the all-girls Team Afghanistan through email. This includes checking up on team progress and answering any questions about robotics.

Team Albania

CircuitRunners kept in contact with Team Albania, giving them advice on organizational procedures and guiding them through the process of starting FLL in their country. We believe that FLL in Albania could be extremely impactful, introducing students to robotics at an early age and motivating them to begin different FIRST programs once they graduate from FLL.

Team Indonesia

Team Indonesia has shown interest in starting an FRC team in their country, and after FGC we walked them through the process for doing so. To this day, CircuitRunners continues to talk to Indonesia about STEM opportunities in the United States and how they can carry them over to their country.

Team South Africa

At FGC, CircuitRunners talked to Team South Africa about starting a local FRC or FTC team, and they showed great interest in doing so. After exchanging contact information with their mentor and members at the event, we provided more information and resources to facilitate starting an FTC team in South Africa. Today, we continue to offer our assistance both during and after this process is complete.

3. Project Drive Forward

Robot demonstrations have been a part of CircuitRunners since beginning our outreach efforts in 2002, but only recently have CircuitRunners made a focused effort to expand our efforts, rebranding and expanding the program. We call this new initiative **Project "Drive Forward."** It aims to educate our local community about robotics and inspire the next generation to participate. As part of **Drive Forward**, CircuitRunners began building new robots, made specifically to create interest in robotics, including a new t-shirt cannon. We use these robots, along with repurposed FRC and FTC competition robots.

Audiences for **Drive Forward** are many and varied, ranging from the Boy Scouts of America to customers at local Chick-Fil-A restaurants. In the next chapter, we'll go through every type of event CircuitRunners held for **Drive Forward** from the past three years. Many events on this list have been CircuitRunners traditions for longer, but for the sake of consistency, only the past three years will be discussed.

In the past three years, CircuitRunners has run **61** Drive Forward events to a total audience of more than **27,000**.

3.1 Boy Scouts of America

Description: CircuitRunners began demonstrating robots at local boy scout troop events in 2016 and since have seen growing interest in robotics. In just two years driving forward with boy scouts, we have seen many members join their local FLL Teams! At events like the Cub Scout Kick-Off and General BSA Meetings, CircuitRunners has the opportunity to talk to the boy scouts about how the robots work and show them how to drive using the controllers.

CircuitRunners also assists the boy scouts with acquiring their robotics merit badge, which has seven requirements. *(per meritbadge.org)*

For this merit badge, scouts need to understand:

1. Proper safety technique
2. Uses of robotics in industry
3. Fields of robotics
4. Careers in robotics

And need to:

5. Design, build, program, and test a robot
6. Show the robot to their supervisor
7. Attend or research robotics competitions

Events: 9

Timeframe: January 2016 - Present

Direct Audience Size: 300

3.2 Local Schools

Ford Elementary

Description: CircuitRunners went to Ford Elementary School, a school in Acworth, Georgia, and spoke to students about the importance of robotics, let students control robots themselves, and take an active role in the design process.

Events: 1

Date: 10/9/17

Direct Audience Size: 50

Mableton Elementary STEAM Night

Description: CircuitRunners hosted a demo at Mableton Elementary's STEAM Night. There, CircuitRunners used previous FRC robots, current FTC robots, and some smaller robots as visual tools to create interest in robotics. Students were able to control robots themselves and learn how the robots were built.

Events: 1

Date: 1/11/18

Direct Audience Size: 100

Dodgen STEM Night

Description: CircuitRunners presented at Dodgen Middle School's STEM night, using competition robots and some smaller robots.

Events: 1

Date: 1/16/18

Direct Audience Size: 100

Sciencepalooza

Description: The Sciencepalooza was an interactive evening dedicated to science and exploration designed to be enjoyed by the whole family. The event was held at McClure Middle School in Kennesaw, GA. CircuitRunners demonstrated our robots to introduce previously unaware students and family members to robotics

Events: 1

Date: 2/6/18

Direct Audience Size: 150

Harmony Leland Demonstrations

Description: CircuitRunners went to Harmony Leland Elementary School in Mableton, GA. There we taught students about robots and let them to pilot the robots around their classrooms. The teachers said the demonstrations were extremely informative, and CircuitRunners hopes to make this event a perennial one.

Events: 2

Timeframe: 2017-Present

Direct Audience Size: 100 (50 per event)

East Cobb Middle School Math and Science Night

Description: CircuitRunners went to East Cobb Middle School's Math and Science Night, giving a short presentation on robotics and letting students drive one of our FTC team's robots. Many students were very interested in robotics and said they would join CircuitRunners when they graduated middle school and came to Wheeler High School.

Events: 1

Date: 3/15/18

Direct Audience Size: 50

Sedalia Park Fall Festival

Description: CircuitRunners traveled to Sedalia Park Elementary School for their Fall Festival and presented our robots to a large audience of children and parents.

Events: 1

Date: 10/28/16

Direct Audience Size: 250

Norton Park Elementary

Description: The CircuitRunners visited Norton Park Elementary School in Smyrna, GA. There, members discussed their experiences with robotics and encouraged Norton students to get involved.

Events: 1

Date: 10/12/16

Direct Audience Size: 150

Brumby Elementary Science Nights

Description: At Brumby Elementary's Science Nights, CircuitRunners built on the work we had started in the previous year (see below), by further promoting STEM and robotics. CircuitRunners attended the Science Night two days in a row, presenting to different audiences about the impact robotics had on our lives.

Events: 2

Date: 9/21/16, 9/22/16

Direct Audience Size: 100 (50 per event)

Brumby STEM Day

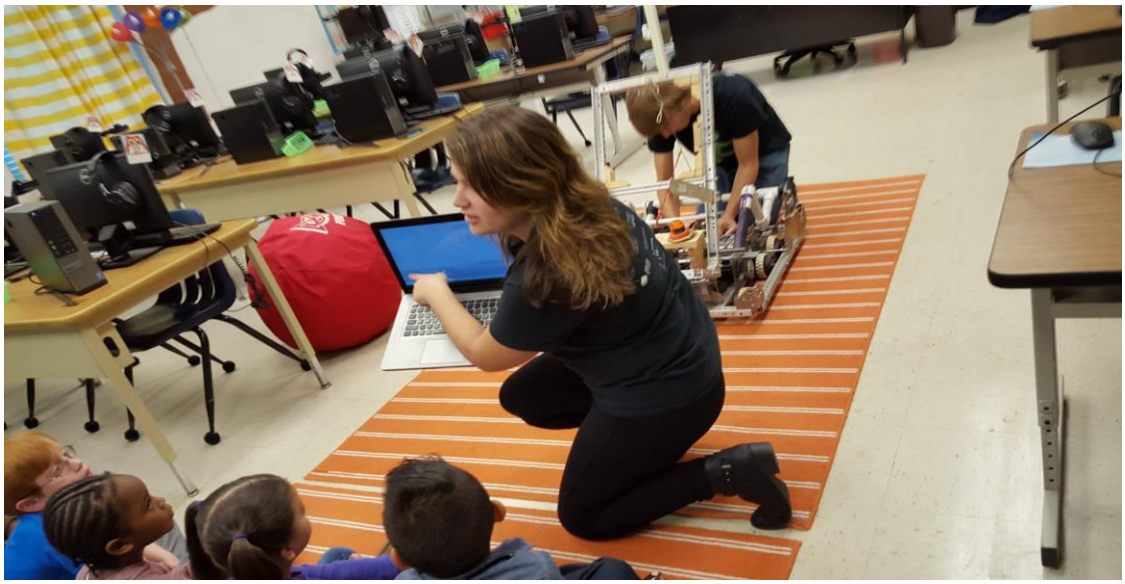
Description: On Brumby Elementary's STEM Day, CircuitRunners visited and introduced the students to FIRST robotics, using previous competition robots from FTC and FRC specifically.

Events: 1

Date: 2/5/2016

Direct Audience Size: 500

East Valley Day of Code



Description: Helped elementary school kids with coding for Day of Code to promote computer science fields. The Georgia Day of Code is an initiative that works to increase the number of students learning computer science and programming. CircuitRunners attempted to improve East Valley students learning by walking them through coding basics and getting them started learning the logic and procedures involved with implementing a program, utilizing easy to understand tools like Scratch. Beyond that, CircuitRunners also introduced the students to FIRST robotics and encouraged them to get involved.

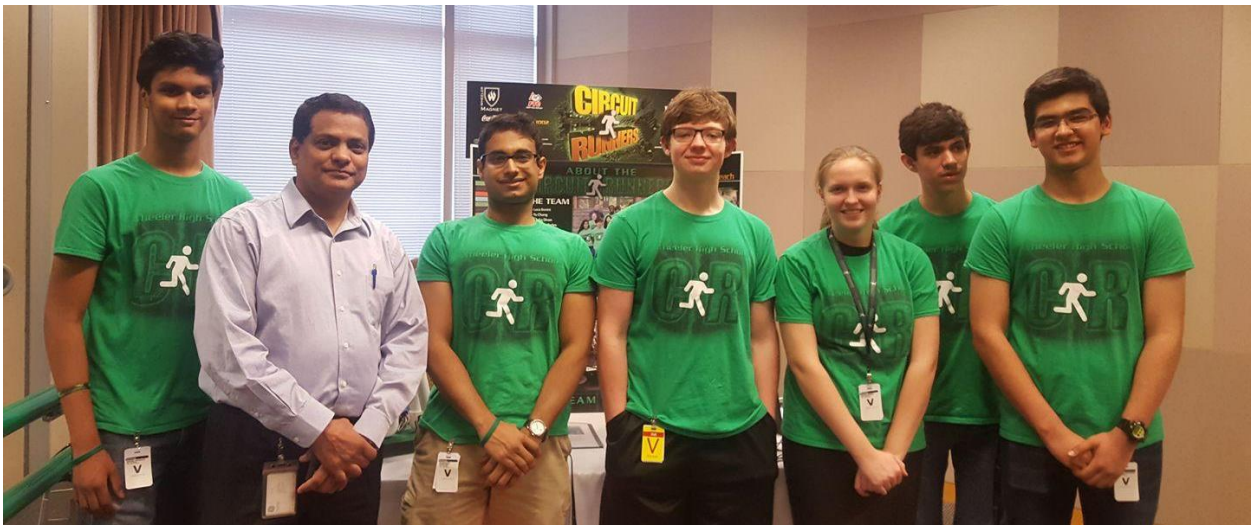
Events: 1

Date: 12/10/15

Direct Audience Size: 80

3.3 General Electric

GE Day



Description: Since 2012, CircuitRunners has participated in GE Day, an event held at General Electric's Marietta location for FRC teams to showcase their robots for the season. At the event, our team demonstrates our FRC robot to employees, families, and students. Overall, we explain how the robot works, talk about our team, network with employees, and interest our audience in becoming a part of FIRST programs (as both mentors and students). The goal of this event is to spread knowledge and increase involvement in robotics programs for high schools

Events: 7 (3 in past 3 years)

Timeframe: 2012 - Present

Direct Audience Size in Past 3 Years: 300 (100 per event)

GE's Girls in STEM Day

Description: Our team is constantly looking for ways to collaborate with prominent groups in the community to spread STEM and robotics. At this event, GE's Girls in STEM Day, CircuitRunners worked with our sponsor, General Electric to run robot demonstrations at East Cobb Middle School. Here, we talked to middle school aged girls about the various opportunities, skills, and career applications in robotics. As a minority group in robotics teams and STEM settings, this event was important for our team to make girls feel more welcome in robotics and recruit them to become a part of their local FLL teams. This was the first event, and we hope to continue demonstrating robots to this lively group for many years to come.

Events: 1

Timeframe: 2017 - Present

Direct Audience Size: 50

3.4 Chick-Fil-A

Chick-fil-A Eastlake

Description: At Chick-Fil-A Family Nights, CircuitRunners demonstrates robots to people of various ages, including young children and their parents, and educates them about the positive impact on learning through participating in FIRST programs. We also give information about and recruit many to join their local FLL, FTC, and FRC teams.

Events: 1

Timeframe: 2017

Direct Audience Size: 30

3.5 Cobb EMC

Cobb EMC Lego Building Nights

Description: In 2016, CircuitRunners ran elementary and middle school lego building competitions with our sponsor, Cobb EMC. At this event, we worked with students from 2nd to 8th grade and demonstrated our competition robots to them. Here, we were able to recruit many students to join their local FLL teams!

Events: 4 (1 in past 3 years)

Timeframe: 2014-Present

Direct Audience Size: 300

3.6 Wheeler Demonstrations

Demonstrations that take place at Wheeler High School, or to primarily Wheeler High students. These make up a significant portion of Drive Forward, and their purpose is to make sure we don't miss the students directly in front of us, while we're reaching out to students all across the globe. CircuitRunners has utilized Wheeler Demonstrations to steadily increase the number of members on our team, with approximately 100 the past two years.

Homecoming Pep Rallies

Description: Have demonstrated our t-shirt cannon and talked about our robotics program at pep rallies. In one pep rally, partnered with art class to dress our robot as a bull and drive around the room. The video of this received 21,000 unique views on Facebook. Picture shown above.

Events: 3 in the past 3 years, 1 each year

Timeframe: 2016 - Present

Direct Audience Size: 2,500 per event; approx. 5,000 unique total

STEM & STEAM Symposium

Description: Demonstrated our robots during the Wheeler STEM & STEAM Symposiums (renamed STEAM Symposium in 2017) in a separate booth. The STEAM Symposium is an event where projects in science, technology, engineering, arts, and mathematics are showcased to a large audience.

Events: 3. Will be at next symposium on April 25th, 2018.

Timeframe: 2015-Present

Direct Audience Size: 800 per event; Approx. 2,000 unique total

Wheeler Football Games

Description: We shot off t-shirts for spectators during halftimes of Wheeler Football games. Videos of our robot were shown on local broadcasts of Wheeler games. This is not considered in the audience size, but we do think it can have an effect on normalizing and promoting robotics in our school

Events: 10+ games, 2 seasons

Timeframe: 2015 - 2017

Direct Audience Size: 2,500 per season; approximately 4,000 unique total audience

Magnet Open House

Description: We show off our shop and robots to prospective magnet students and their parents, shoot our t-shirt cannon, and explain how the robotics organization operates. This event is held twice a year, once for the possible applicants in the fall and again for the accepted students in the spring.

Events: 6 in past 3 years

Timeframe: 2015 - Present

Direct Audience Size: 900 per event; Approximately 4,000 unique total audience.

Wildcat Daze

Description: We show off robots and the club to Wheeler students and their parents, including a discussion of the different sub-teams and opportunities within CircuitRunners. Within this description, we focus on a few main subjects:

- Programming
    - We demonstrate with models created by CircuitRunner programmers.
- CircuitRunners Business Team
    - Presenters go over in detail the aspects of robotics outside of technical work and how they can help students prepare for life beyond high school.
- Build
    - Build members discuss the different groups within build - electrical, mechanical, etc. - and use the robots as a tool to display the efforts, results, and strategies of the build team in practice.

Events: 3 in past 3 years

Timeframe: 2015 - 2018

Direct Audience Size: 1,500 per event; approximately 3,000 unique total audience.

3.7 Local Churches

Holy Family Fall Festival

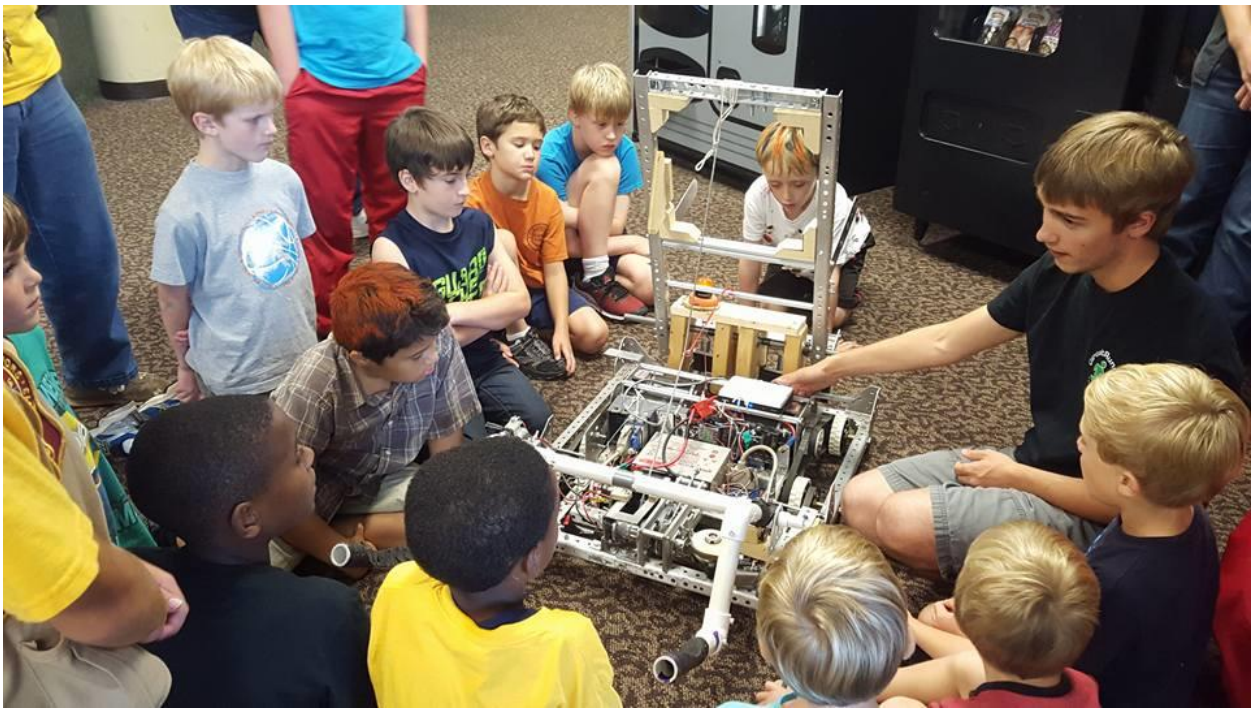
Description: Showcased robots at Holy Family Catholic Church for their fall festivals. A focus of these events was shooting t-shirts from our T-shirt cannon, because the audience seemed very interested in this. Attendees also participated in a "Battlebots"-like competition, where they could control smaller robots with the intent of knocking other robots off the platform.

Events: 2

Timeframe: 2016-17

Direct Audience Size: 400 per event. Approximately 600 total audience

East Side Baptist Church



Description: A visit to East Side Baptist Church to teach young kids, grades K through six, about robotics and encourage them to participate in robotics. We used a previous FRC robot as an example and built the discussion from there.

Events: 1

Timeframe: 2015-2016

Direct Audience Size: 20

3.8 Other

Makerfaire

Description: CircuitRunners presented our robots at MakerFaire, "*the Greatest Show (and Tell) on Earth—a family-friendly showcase of invention, creativity and resourcefulness, and a celebration of the Maker Movement. It's a place where people show what they are making, and share what they are learning.*" according to atlanta.makerfaire.com. The experience was fascinating. CircuitRunners got to share our experiences in robotics with other innovators and find ideas for our robots from the other inventions being showcased.

Events: 1

Date: 10/22/17

Direct Audience Size: 600

Kosher Barbecue Competition

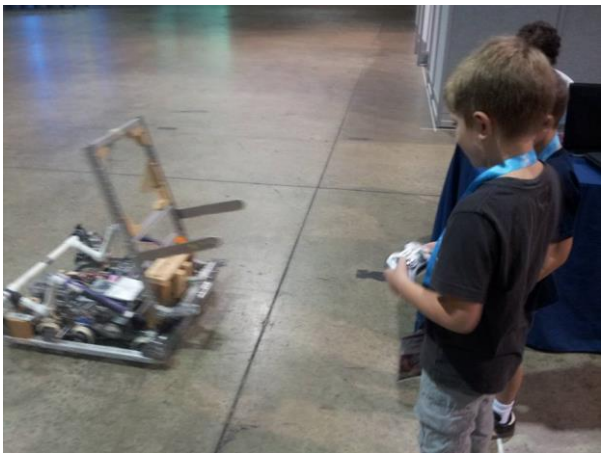
Description: CircuitRunners joined the festivities by shooting off t-shirts to spectators and participants. This event was unique in that we presented our robots to an audience outside of an educational setting.

Events: 1

Timeframe: 10/18/2015

Direct Audience Size: 4,000

F3 Expo



Description: At the F3 Expo, an event for showcasing drones and educating the public about the positive impact these robots can have on our lives. At this event, CircuitRunners demonstrated our robots alongside Grady and GaFIRST.

Events: 1

Timeframe: 11/15/2015

Direct Audience Size: 200

Boxerstock Music Festival

Description: Boxerstock is a music festival raising money for boxer rescues. CircuitRunners love supporting other good causes and working with other nonprofit groups in a mutually beneficial relationship. We were featured on stage to shoot t-shirts with our t-shirt cannon.

Events: 1

Timeframe: 10/11/2015

Direct Audience Size: 400

PDK Airshow

Description: Showed off robots to attendees of the PDK Good Neighbor Airshow with 4468 Fernbank LINKS.

Events: 1

Timeframe: 5/30/2015

Direct Audience Size: 300

4. Summer Camps

CircuitRunners has found that one of the best ways to interest students in robotics is by giving them the ability to build and letting their creativity run free. We try to allow this at **Drive Forward** events, but it's not always possible with the limited time frame and materials available at a demonstration. Therefore, to fill this need CircuitRunners turns to three Summer Camps, held in partnership with the Wheeler Magnet Program, which is also dedicated to the promotion of STEM education.

Not all students are looking to build robots, but there is a place in robotics for every student. Within CircuitRunners' competition teams, students that are less interested in the mechanical aspect of robotics work on business or programming teams. Similarly, every student is exposed to robotics for some time at the three camps, but students who are interested in STEM, but not necessarily building robots, can pursue other Engineering and Science related subjects for the rest of the program.

4.1 Science Spectrum

Description: Science Spectrum is a five-day camp designed for 60 rising 7th, 8th, and 9th grade students who have an interest in science and engineering. Students explore six areas of STEM: Robotics, Chemistry, Forensics, Electronics, Biotechnology, and Engineering. For the first two days, students spend time in all six fields, then choose a focus area for the next three days.

They spend this time completing a project that they have liberty in creating, but within a set of guidelines. At the end of the program, students can take their project home with them. Having a take home project is important, because students will remember their experiences when they use or look at their project and return to STEM, reminding them of the opportunities available in STEM.

Audience: 60

Timeframe: June 11-15

Robotics Section: The students built small robots from a VEX kit of parts over the course of three days. Before the build, CircuitRunners taught students about the basic build and design process and explained some different terms for the parts of a robot. Students were then set free to build the robots in groups of three under their own designs.

The task set to the robots was simple. Each robot needed to stay on a large hexagonal platform for the longest. To encourage the spirit of friendly

competition, teams competed against each other, pushing other robots off. No devices intended to destroy or break other robots were allowed.

At the end of this process, teams described changes they would make to their build strategy if they could do the camp again and CircuitRunners introduced students to more robotics competitions, including FLL, FTC, and FRC. Many students that participated in the robotics section joined their local FLL teams and joined CircuitRunners afterwards.

Other Sections: In the other five sections, students completed similar projects in the fields of Chemistry, Forensics, Electronics, Biotechnology, and Engineering. These subjects are all fairly related to robotics, and we have many students that will participate in one of these areas during the camp, and then still join CircuitRunners or their FLL, FTC, or FRC teams.

In Electronics, students learn about safety, basic electrical concepts, components, circuitry, and soldering techniques. They use a hands-on circuitry kit to construct an electrical device.

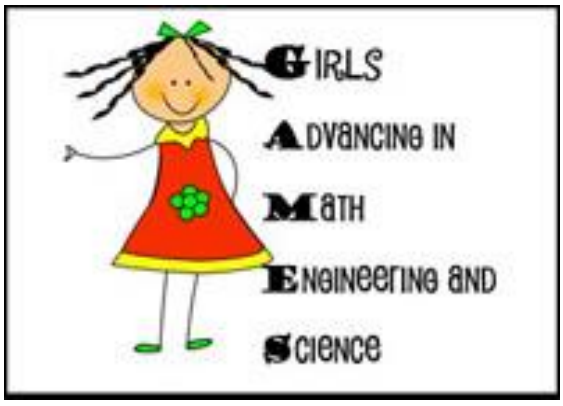
In Biotechnology, students are taught about basic biological concepts, then use microscopes and video to study microscopic organisms.

In Chemistry, students are introduced to different types of matter and observe chemical reactions. Students will complete a variety of experiments.

In Forensics, students are introduced to forensic science techniques and tools. Students are required to solve a simulated mini-crime for the camp.

In Engineering, students are introduced to computer modeling software and the engineering design process. They use industrial design software to model their device, then fabricate their device.

4.2 Camp GAMES



Description: Camp GAMES is a five day camp designed for 30 rising 4th, 5th, and 6th grade girls who have an interest in science and engineering. Students explore five areas of STEM: Robotics, Chemistry, Electronics, Biotechnology, and Engineering. During the camp, students will work in application-based workshops with a high teacher:student ratio. Each workshop will correspond to a subject.

They spend this time completing a project(s). At the end of the program, students can take their project(s) home with them.

Camp GAMES is specifically designed to help girls become involved in STEM education. The camp only has girls in it, and the separation helps girls learn to interact with STEM naturally, outside of any preconceived notions of gender or unnecessary stereotypes.

Audience: 30

Timeframe: June 25-29

Robotics Section: The students built small robots from a Lego NXT kit of parts. Before the build, CircuitRunners taught students about different possible robot designs and what is beneficial to a robot versus what is not beneficial.

Robots were challenged to race, competing against each other to encourage the spirit of friendly competition. No devices intended to destroy or break other robots were allowed.

At the end of this process, teams described changes they would make to their build strategy if they could do the camp again and CircuitRunners introduced students to more robotics competitions, including FLL, FTC, and FRC. Many students that participated in the robotics section joined their local FLL teams and joined CircuitRunners afterwards.

Other Sections: In the other four sections, students completed similar projects in the fields of Chemistry, Coding, Biotechnology, and Engineering. These

subjects are all fairly related to robotics, and we have many students that will participate in one of these areas during the camp, and then still join CircuitRunners or their FLL, FTC, or FRC teams.

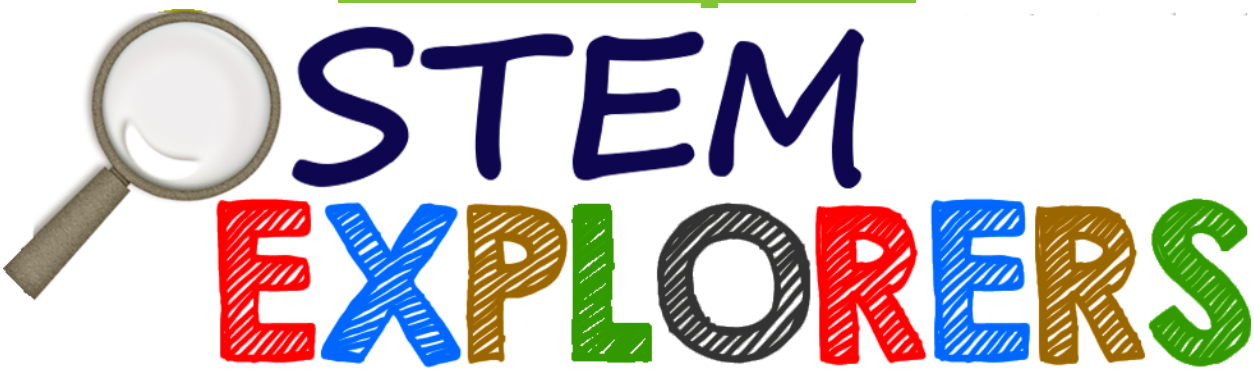
In Biotechnology, students are taught about basic genetics, then use biological equipment under supervision. Students also learn how the other fields can be used in the field of biotechnology.

In Chemistry, students are introduced to different types of matter and observe chemical reactions. Students will complete a variety of experiments.

In Engineering, students are introduced to computer modeling software and the engineering design process. They use industrial design software to model their device, then fabricate their device.

In Coding, students are introduced to the basics of computer science. They learn about algorithms and coding languages.

4.3 STEM Explorers



Description: STEM Explorers is a five day camp designed for 30 rising 4th, 5th, and 6th grade boys who have an interest in science and engineering. Students explore five areas of STEM: Robotics, Chemistry, Electronics, Biotechnology, and Engineering. During the camp, students will work in application-based workshops with a high teacher:student ratio. Each workshop will correspond to a subject.

They spend this time completing a project(s). At the end of the program, students can take their project(s) home with them.

Audience: 30

Timeframe: June 25-29

Robotics Section: Same as Camp GAMES (See on previous page)

Other Sections: Same as Camp GAMES (See on previous page)

5. FIRST Events

These are events that are managed by FIRST but hosted and run by the CircuitRunners.

5.1 FLL Qualifier

Description: Working with GA FIRST, we host a local tournament for the FIRST Lego League. Children from ages 9-14 compete with EV3 robots and present to judges about their projects, teamwork skills, and robot design.

Judges, referees, and volunteers are all CircuitRunners, CircuitRunner Alumni, and CircuitRunner Mentors. The event is planned and run entirely by CircuitRunners high school students, providing a valuable work experience. Often, the event is held in different locations and with many teams, so directors have to

book venues, organize transport, arrange volunteering, and register teams.

This year showcased the resiliency of CircuitRunners Leaders especially. The day before the 2017 qualifier, Marietta was hit with snow, causing our county and many others to cancel all after school and weekend activities.This meant that we were unable to set up for our FLL Qualifier that night and host it the next day. CircuitRunners was devastated that so many FLL teams would have to lottery to go to state championships and many would not even have the chance to compete that season. So, immediately after cancellation, our team started working with GA FLL to reschedule the qualifier for the following week. Fortunately, we were able to get back on our feet and put on a spectacular Qualifier with Mt. Paran Christian School.

Events: 7

Timeframe: 2011-Present

Audience: Averages about 30 FLL teams

5.2 Grey FTC League Events

Description: FTC Leagues were new for both CircuitRunners and Georgia FIRST this year, replacing the old FTC qualifier system. CircuitRunners had held FTC Qualifiers for six years before this one, so our team was experienced enough to move past the change quickly. The league we hosted, the Grey FTC League, was based in East Cobb and had 11 teams. These teams met at seven different league events, which were brief competitions held frequently throughout the FTC season.

Events: 7

Timeframe: 2017 - Present

Audience: 11 FTC Teams

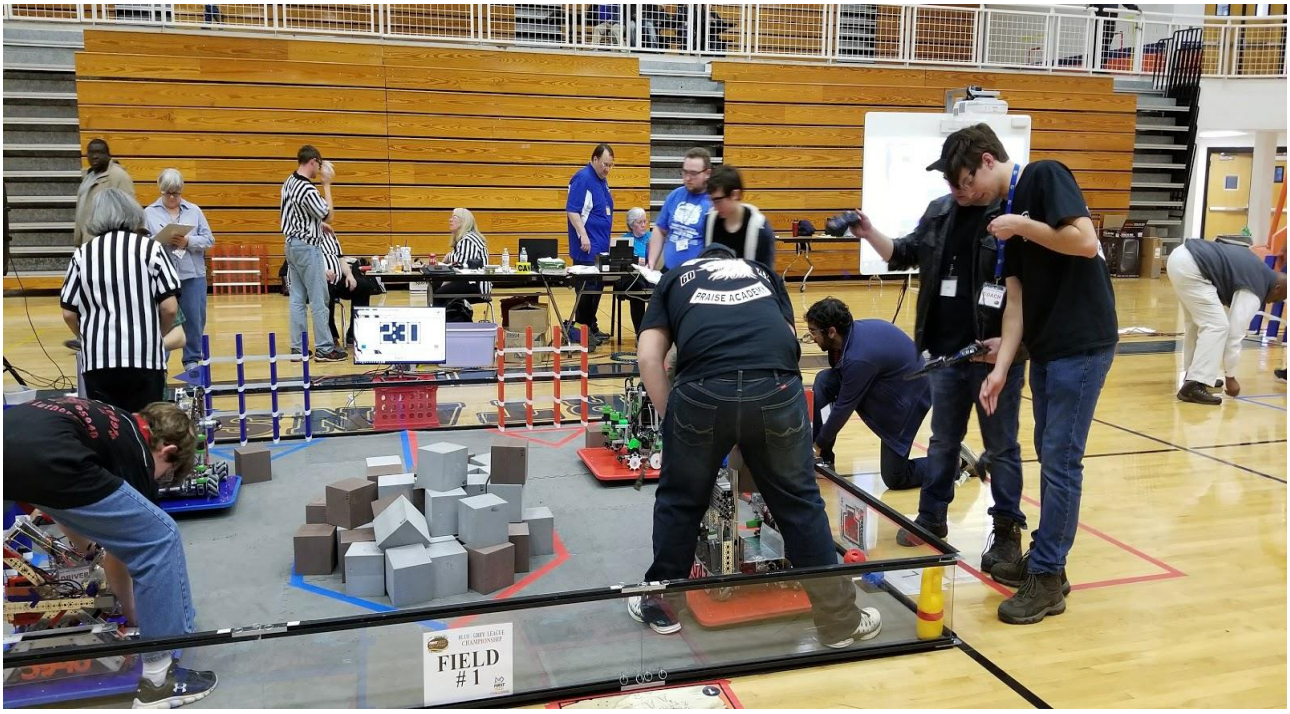
5.3 Northwest FTC League Tournament

Description: CircuitRunners was not the only team running the Northwest FTC League Tournament, but we worked in collaboration with other teams to run the event. The tournament featured the teams from the Grey and Blue Leagues, based in East Cobb and Douglasville respectively. In total, 22 teams attended, and from these, eight advanced to the Georgia State Championship.

Events: 1

Timeframe: 1/27/2018

Audience: 22 FTC Teams



6. Assistance Events

Assistance events are called as such because they are days where CircuitRunners invites several different teams to a venue and helps them with issues they might be experiencing. This service is provided completely free of charge. It goes well with our distance mentoring and assistance efforts, because it provides at least one day where CircuitRunners can work face to face with teams. Afterwards, that event can be used as a baseline from which to mentor or assist teams further.

6.1 Jr. FLL Workshop Day

Description: CircuiRunners recognizes the importance of getting the public involved in FIRST programs from a very young age so they may continue to learn and grow through each team. With goals of increasing participation in FIRST, CircuitRunners hosted a Jr. FLL Workshop Day. At this event our team introduced younger children to the activities they would do and skills they would learn on a Jr. FLL Team. At the event, we started multiple Jr. FLL Teams.

Events: 1

Timeframe: August 2016

Audience: 40

6.2 FLL Workshop Day

Description: The FLL Workshop constitutes a practice that has become ingrained into CircuitRunners and local FLL culture from years of occurrence. Every year, just after the FLL game is released, CircuitRunners holds a workshop going over all the aspects of the game and being an FLL team member.

FLL teams rarely have students with more than one or two years of experience and the students are quite young, so we've found it to be beneficial to have classes discussing parts of an FLL robotics competition, how to build a robot, how to program a robot, how to execute a project, and how to explain all these steps to judges.

Events: 5

Timeframe: 2013 - Present

Audience: 20 - 40 FLL Teams depending on the year

Coaches Panel:

This panel is one of the most important parts of the workshop, helping the mentors and coaches of the attending FLL teams learn about FLL and how to coach a team. This year, CircuitRunners had experienced FIRST leaders, Linda Pham and Lori O'Neal gave the judges panel, and every year CircuitRunners tries to modify our content to ensure that teams are receiving the best learning experience. Also, importantly, new coaches have the opportunity to get answers to their questions and network with the greater FIRST mentoring group.

Classes: 8 (Explained Below)

Game Strategy:

This game explains the new game, going into detail about how each part of the game interacts with the rest and the different strategies teams can have. CircuitRunners makes sure not to tell teams a specific strategy to follow, instead explaining to them how to formulate a game strategy and follow it.

Intro to EV3:

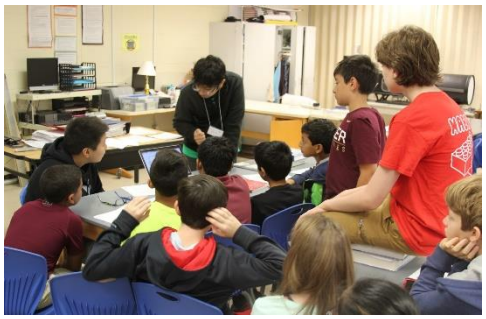
This class is mostly for newer teams, introducing them to the EV3 robots and explaining the basics of building with them.

Beginners EV3:

This class is mostly for newer teams, teaching the basics of EV3 robots and how to use parts and pieces most efficiently. This class also covers how to beginning programming the robot and how to use the Lego Mindstorms programming software properly.

Advanced EV3:

This class finishes the building instructions given in the previous two workshops and delves into the advanced programming aspects of Lego Mindstorms EV3. This class is recommended for both experienced and newer teams, though newer teams should have taken Beginners EV3 or Intro to EV3 before this one.



Judging Overview:

This class provides a basic overview of judging for students and their coaches. CircuitRunners explain how the judging process operates and how that factors into competition advancement and awards. Teams are given the opportunity to ask any questions about judging they might have.

Project Jumpstart:

This class focuses on the Project aspect of FLL. Former Project judges

explain the idea of the Project and the specific topic of the Project for that year. Then, students do a mini-project exercise, creating a skit and presenting it. The presenters give the students advice for improvement. Teams can ask questions about Project they did not have previously answered.

Core Values of FIRST:

This class goes over the core values presentation at FLL tournaments, focusing on how teams should act in front of judges and how teams should work together to solve Core Values challenges. Teams are given the opportunity to participate in a mini-judging session of their own and attempt to complete the task given. Afterwards, the presenters give the students advice for improvement and teams can ask questions if they have any.

Completing the Circuit:

This class is one of the most important ones available. It is geared towards graduating FLL students, and it focuses on the robotics programs that they can join after FLL. CircuitRunners shows students our shop and robots. Team members are encouraged to participate on their local FTC and FRC teams or on CircuitRunners if they are planning on attending Wheeler.

6.3 FLL Scrimmage

The FLL Scrimmage is an event that CircuitRunners hosts to allow FLL teams to test their robots and talk to judges before the real competition. Practicing in a real competition environment can be very beneficial and with the autonomous coding of FLL robots, frequent testing is important. Additionally, many FLL teams and students do not have lots of experience with judging and presenting, so giving a mock presentation can help them learn. To ensure that attending FLL teams are receiving the best experience, CircuitRunners only uses mock judges that have judged at a real FLL Qualifier before or have taken the certification classes for FLL judging.

Events: 7

Timeframe: 2011-Present

Audience: 20-40 FLL Teams depending on the year

7. Advocacy

CircuitRunners works to make robotics accessible to everyone in our community and to inform our leaders of the importance of promoting STEM. Our team actively participates in events to extend our reach, and in the process, have talked to many influential community leaders. We call this Advocacy, and it is one of our most important types of outreach. CircuitRunners advocacy has had real impacts on the STEM community in our county, getting a bill passed that provided stipends for STEM coaches, which we believe dramatically helped teachers participate in STEM programs without sacrificing their own livelihood.

7.1 Cobb Leadership Tour of Wheeler High School

Description: This year, CircuitRunners had the privilege of talking to a variety of leaders in our community, including educators and CEO's from all over Georgia at the Cobb Leadership Tour of WHS. During this presentation, we informed our audience of the importance of robotics in our community and its application to all industries. We also discussed CircuitRunners' individual impact on our community and school, including the skills our members learn, our strong outreach program, and our competition robots. Throughout this event, we ensured that our leaders understood the impact of robotics on our members' lives.

Date: 11/29/2017

Direct Audience Size: 50

7.2 Sope Creek STEM Certification

Description: CircuitRunners is always looking for ways to assist other schools in our community and has grown strong partnerships with them throughout the years of demonstrating our robots. This last fall, one of the elementary schools in our community, Sope Creek, was going to be reviewed for STEM certification, so CircuitRunners interviewed with several Cobb and Georgia Board of Education members and discussed our partnership with the school. Through this event, we were able to talk about unique ways our team spreads STEM in schools and the impact of our involvement on student learning.

Date: 10/02/2017

Direct Audience Size: 20

7.3 Wheeler STEM & STEAM Certification

Description: CircuitRunners focuses its efforts in promoting STEM and STEAM in our community. One way we facilitated its spread was through assisting our school in becoming the first high school in Georgia to be STEM recertified and STEAM certified. The process for obtaining certification included a reviewal and interview process, where several Cobb and Georgia Board of Education members, including State Superintendent Richard Woods and Cobb Superintendent Chris Ragsdale, talked to students about what they do in classes and extracurriculars to determine if our school excels the requirements. During this time, CircuitRunners demonstrated our robots and spoke with many of these leaders about how robotics promotes STEM in our community and school, and how our team creatively inspires and informs others. These events marked additional opportunities for CircuitRunners to discuss the importance of robotics with the Cobb and Georgia Superintendent, past the usual correspondence.

Dates: April 2016 & April 2017

Direct Audience Size: 50

7.4 Cobb Chamber of Commerce

Description: CircuitRunners presented to the Cobb Chamber of Commerce, which is a community of more than 2,500 local businesses and organizations. This advocacy was extremely helpful, giving CircuitRunners connections with businesses in our community and impressing upon local organizations the importance of STEM and robotics to the youth.

Date: 12/2/2015

Direct Audience: 100

7.5 National Advocacy Conference

Description: In 2014, CircuitRunners leadership traveled to Washington, D.C. along with several other FIRST teams from around the country for the National Advocacy Conference. There, we discussed robotics with a number of congressman and elected officials, pushing for the promotion of STEM education. Afterwards, we invited both Sandra Deal and our then-US House Representative to our school and personally gave them tours of our robotics program. This program was important, because it showed our elected officials the importance that robotics has to their constituents on a national level.

Date: 6/14/2014 - 6/16/2014

Direct Audience: 100

Contact Information

Social Media/Online Connections

Website: www.circuitrunners.com

Team Email: info@circuitrunners.com

Facebook: www.facebook.com/circuitrunners

Twitter: www.twitter.com/circuitrunners

Other Social Media Sites: www.youtube.com/user/CircuitRunners

Main Contacts

For Outreach Information: outreach@circuitrunners.com

Title: Director of Outreach

Alternate Email: keshav.shenoy@circuitrunners.com

Phone: (404) 593-5751

Team Meeting Information

Location: 375 Holt Road, Marietta, GA, 30068

Dates: Mon-Fri

Times: 3:45 pm-6:00 pm